

**APPENDIX V  
EXAMPLE STATEMENT OF WORK**

**SCOPE OF WORK  
ARCHITECT-ENGINEER SERVICES FOR  
PLANS AND SPECIFICATIONS  
RIO DESCALABRADO SECTION 205 FLOOD CONTROL PROJECT  
SANTA ISABEL, PUERTO RICO**

**1. REFERENCES.**

1.1. Indefinite Delivery Contract (IDC). This task order will be issued under IDC DACW17-01-D-0022, dated 12 July 2001.

1.2. Federal, State/Commonwealth, and Industry Standards. Some applicable federal, state/commonwealth, and industry standards are referenced below and listed in Exhibit A. All applicable standards, including those that are not referenced or listed, constitute criteria for the design of this project.

**2. PRECEDENCE.** This Scope of Work (SOW) and the accompanying Exhibit A provide specific instructions for the design of this project and, in case of conflicts, take precedence over the requirements of Section C of the IDC.

**3. OVERVIEW.** The project is located in the floodplain of the Rio Descalabrado basin at the rural community of Playita Cortada. Playita Cortada is located on the southern coast of Puerto Rico and is part of the Municipality of Santa Isabel. Playita Cortado lies on the south side of Highway 1, about 5 kilometers west of the town of Santa Isabel and 20 kilometers east of Ponce. The community extends along the east flood plain of Rio Descalabrado from the highway to the coastline. Approximate ground elevation in the area ranges from 1 meter mean sea level (msl) at locations near the sea to 6 meters msl at P.R. Highway 1. East of the community, along the beach, is a mangrove forest approximately 13 hectares (32 acres) in size. A small creek, which runs east of Playita Cortada, forms the eastern border of the mangrove forest. Another smaller creek runs parallel to the eastern border of the community and merge the first mentioned creek within the mangrove forest. The Rio Descalabrado drainage area is about 49.3 square kilometers (19 square miles). The project consists of:

3.1. Levees: A 3,690 meter long ring levee, designed to protect against the standard project flood, will be constructed along the west, north and east side of Playita Cortada. P.R. Highway 1 will ramp over the levee at two locations at the northwest and northeast section of the levee.

3.2. Drainage Ditches: Minimum drainage ditches and culverts to convey local runoff are included on the interior and exterior levee sides.

3.3. Culverts: Six drainage structures consisting of corrugated metal pipes (CMP) with concrete headwalls and wingwalls. Three of these six structures will provide interior drainage. Culverts near the ocean will be equipped with flapgates on the levee floodside to prevent backflow into the interior protected area.

3.4. Recreation Features: A 6'-wide asphalt biking and hiking trail will be constructed on the levee crown. The P.R. Highway 1 ramps will include self-actuated traffic lights and appropriate signs in order to accommodate pedestrian and bicycle traffic. Bollards will be installed on the levee to prevent vehicle from accessing the levee at these crossings. A sufficient number of lockable, removable bollards will be provided for authorized vehicle access to the levees. Four covered picnic tables will be installed on each end of the levee near the ocean.

**4. DESCRIPTION OF WORK.** This SOW covers all services required to prepare plans, specifications, and other supporting documents necessary for construction of the project features described in the Rio Descalabrado Final Detailed Project Report, dated February 2000. A complete design, including a bid schedule, an order of work clause, a construction contractor submittal register, quantity and cost estimates, M-CACES construction cost estimates, a proposed construction schedule, design analyses and calculations, a design documentation report, an engineering considerations and instructions report, and a draft operations and maintenance manual shall be developed for this project.

**5. REQUIRED A-E SERVICES.** The A-E shall perform the services indicated in this Scope of Work, including Exhibit A, and Section C of the IDC. These services will be provided in three distinct phases:

- Concept (30%) Design
- Preliminary (60%) Design
- Final (100%) Design

The drawings, specifications, and all other submittal items for this task order will be prepared using metric units of measurement.

#### 5.1. Drawings.

5.1.1. General. The A-E shall prepare drawings in a manner that clearly and adequately delineates the work to be accomplished by the construction contractor. Design documents will be sufficiently detailed to permit construction contractors to submit responsive bids without visiting the project site. The cover sheet will be signed and stamped by principal of the firm who is a registered professional engineer. All drawings will be created using Computer Aided Design and Drafting (CADD) technology and shall conform to the Tri-Service A/E/C CADD Standards, Release 1.7. These CADD standards are available on the Internet at <http://tsc.wes.army.mil/News/aecs.asp>. Additional criteria for preparation of drawings are contained in ER 1110-2-1200.

5.1.2. CADD Files. One CADD (\*.DGN) file shall be used per drawing (sheet). All design and site condition features will be shown in each CADD drawing file. No reference files will remain except for the border file, photos and other raster files (\*.COT).

5.1.3. Format. All drawings and sketches will be provided in both hard copy and MicroStation™ file format. Full-sized drawings shall be developed as "F" sized sheets (41" x 29" at the trim line) and shall utilize the standard Corps of Engineers Jacksonville District title block. Half-sized drawings are to be provided on 20½" x 14½" (at the trim line) sheets. Original

drawings and details must be of adequate size, and be clear and sharp, so that the use of half-size reproducible will result in legible and easy to read copies.

## 5.2. Specifications.

5.2.1 General. The A-E shall utilize the Corps of Engineers Guide Specifications (CEGS) which are the set of master guide specifications reflecting HQUSACE technical policy. These guide specifications are available over the Internet at <http://www.usace.army.mil/usace-docs/>. SPECSINTACT software will be used for the preparation of project specifications in accordance with ER 1110-1-8155. This software is available from the National Aeronautics and Space Administration over the Internet at <http://www-de.ksc.nasa.gov/specsintact/>. Specifications shall conform with industry standards for format and content as established by the CSI Manual of Practice.

5.2.2. Bid Schedule and Contract Clauses. The A-E shall prepare a project bid schedule that includes all required payment items. Consult the Jacksonville District Project Engineer in developing the bid schedule. The Government retains responsibility for preparation of Division 00 contract clauses (Sections 00010, 00100, 00600, 00700, and 00800).

5.2.3. Outline Specifications. The A-E shall develop an outline specification listing the proposed guide specifications and A-E-prepared sections that will be used for the project. The outline specification will list the guide specification number and title for each proposed section. Sections shall be arranged within their respective divisions, in numerical order. New specification sections, developed by the A-E, will be numbered to fall in their respective division at a logical location.

### 5.2.3.1. Division 1. Division 1 consists of the following sections:

- Section 01000 - General Requirements
- Section 01320 - Contractor Prepared Network Analysis System
- Section 01330 - Submittal Procedures
- Section 01410 - Environment Protection
- Section 01411 - Turbidity Monitoring
- Section 01451 - Contractor Quality Control

The Government will provide Jacksonville District's Master Guide Specifications for these sections. The A-E shall edit these specification sections and, if necessary, convert them into SPECSINTACT format. Jacksonville District's Project Engineer will provide input for certain sections. This input consists of the construction contract performance period, liquidated damages, accommodations for Government personnel, Government field office requirements, contractor-furnished radios and vehicles for Government personnel, contractor quality control staffing requirements, and annotated hard copies of specification Sections 01410 and 01411. The A-E will obtain all other information necessary to complete Division 1 specification sections.

The A-E shall also prepare an “Order of Work” clause for insertion in Section 01000. The clause shall either state the required sequence of construction operations for this project or state that the order of work shall be at the discretion of the construction contractor.

5.2.3.2. Divisions 2 through 16. The A-E must edit and adapt CEGS to satisfy the project requirements and provide a complete set of construction specifications. In instances where there are no appropriate guide specifications available for use, the required specifications will be prepared by the A-E. These specifications shall list the essential features, functions, and other factors to clearly indicate the type and quantity of items/work required. All specifications will be prepared by listing parameters and requirements that can be met by several manufacturers. The use of trade names and proprietary items in the specifications must be specifically approved by the Jacksonville District’s Project Engineer.

5.2.3.3. Construction Contractor Submittal Register. The specifications require the construction contractor to submit shop drawings, samples, manufacturer’s data, certificates, test reports, and other items to the Government. The A-E shall prepare a complete listing of construction contractor submittal requirements on Eng Form 4288 using SPECSINTACT. These submittals will be classified as either “Government Approval” or “For Information Only.” All non-critical submittals should be classified as “For Information Only”. Those submittals that are critical to safety, construction execution, and system or facility operation should be classified as “Government Approval”. The type of submittals requiring government approval are extensions of design, critical materials, deviations, O&M manuals, or those involving equipment that must be checked for compatibility with the entire system.

### 5.3. Quantity and Cost Estimates.

5.3.1. Format. The A-E shall prepare quantity computations, cost estimates, and construction cost estimates for this project. All construction cost estimates shall be developed using M-CACES (version 5.30) software. These estimates must conform with the requirements contained in ER 1110-1-1300, ER 1110-2-1302, and EI 01D010. A controlled materials report is not required for this task order.

5.3.2. Cost Estimate Submittal. The M-CACES cost estimates shall be submitted in 2 hard copies only, separate from the other design documents, and in electronic form on a 3.5-inch computer diskette(s). Cost estimates shall be submitted only to Ms. Penny Wise, P.E., Chief, Cost Engineering Branch, Engineering Division.

5.3.3. Proposed Construction Schedule. The A-E shall prepare a proposed schedule for construction that is consistent with the project construction cost estimate. During development of this schedule, due consideration will be given to standard construction practices, durations of tasks, the sequence of construction, procurement of materials, climatic conditions, etc. The Proposed Construction Schedule should be in the form of a bar chart. Engineering Instructions 01D010 contain additional guidance regarding preparation of this schedule.

5.4. Design Analysis (DA). The A-E shall develop a DA that addresses general project parameters, functional and technical requirements, design objectives, design assumptions, and contains calculations applicable to the project’s design. Guidance regarding the content and

procedures for preparation of the DA are contained in ER1110-345-700. The DA will be updated during each phase of design.

## 5.5. Quality Control.

5.5.1. Quality Control Plan. The A-E shall prepare a Quality Control Plan (QCP) which includes the following as a minimum:

- 5.5.1.1. Identification and discussion of all organizational and technical interfaces.
- 5.5.1.2. Design team members and their areas of responsibility.
- 5.5.1.3. Team members responsible for checking the design
- 5.5.1.4. Team members responsible for checking the electronic files
- 5.5.1.5. Independent Technical Review (ITR) team and an explanation of how they will perform their duties
- 5.5.1.6. Project Schedule showing key milestones and review periods.

5.5.2. Independent Technical Reviews (ITR). The A-E shall perform an ITR during each phase of design development. These ITRs will be conducted by qualified engineers (one per discipline) who are not part of the design team and documented in accordance with the requirements contained in Appendix F of ER 1110-2-1150. Formal written comments will be generated by each member of the ITR team and annotated by designers to indicate the intended corrective action. These corrective actions will be incorporated into the design during the same phase in which the review is conducted, prior to submission to the Government. Copies of all annotated ITR review comments and certification statements shall be furnished as an appendix to the Design Documentation Report. ITR certifications shall be certified by one of the firm's principals or authorized representative.

5.5.3. Quality Assurance. The Jacksonville District will perform a quality assurance review of all A-E work to confirm that proper criteria, regulations, laws, codes, principles and professional procedures have been used. This should confirm the utilization of clearly justified and valid assumptions that are in accordance with policy. It should also assure resolution of legal, technical and policy review issues. The Jacksonville District will review the work of the A-E during each phase of design and return comments using the DrChecks system.

5.6. Design Documentation Report (DDR). The A-E shall prepare a DDR and update it during each phase of design. The content and format of this report must conform with requirements contained in Appendix D of ER 1110-2-1150. ITR comments and certification statements, documentation of QC reviews, and minutes of meetings will be incorporated into the DDR as separate appendices. The DDR shall also contain copies of site visit reports and all records of discussions.

5.7. Engineering Considerations and Instructions (ECI) Report. The A-E shall prepare an Engineering Considerations and Instructions for Field Personnel Report in accordance with Appendix G of ER 1110-2-1150. The purpose of the ECI is to inform field personnel of critical quality control issues that must be addressed during construction. The ECI should also highlight important elements of the design and provide a better understanding of the project's intended function.

5.8. Operations and Maintenance Manual. The A-E shall prepare a draft Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual (OMRR&R Manual) in accordance with ER 1110-2-401. The Government will insert construction history and as-built information upon completion of construction.

5.9. Site Visits, Meetings/Conferences, and Discussions.

5.9.1. Site Visits. The A-E shall visit the project site during the Concept (30%) Design Phase. The purpose of this visit is to observe and evaluate existing field conditions and to gather supplemental site data necessary for performing the design. A follow-up site visit will be conducted during the Preliminary (60%) Design Phase. The Jacksonville District Project Engineer will be notified of these site visits well in advance of their occurrence. Reports summarizing the conditions observed, personnel contacted, and data gathered during the visits shall be prepared and included in the Design Documentation Report.

5.9.1.1. Concept (30%) Design Phase Site Visit. The following A-E representatives shall participate in this two-day site visit: Project Manager, Senior Civil Engineer (General Site and Drainage Design), Civil Engineer (Highway Design), Senior Geotechnical Engineer, and Senior Electrical Engineer.

5.9.1.2. Preliminary (60%) Design Phase Site Visit. The 60% site visit shall include coordinating the latest design with the local agencies including the Puerto Rico Department of Natural Resources, the Puerto Rico Electric Power Authority (PREPA), the Puerto Rico Aqueduct and Sewer Authority (PRASA), the Puerto Rico Department of Transportation and Public Works (DTPW), through its Highway and Transportation Authority (PRHTA). The following A-E representatives shall participate in this two-day site visit: Project Manager, Senior Civil Engineer (General Site and Drainage Design), Senior Geotechnical Engineer, and Senior Electrical Engineer.

5.9.2. Meetings/Conferences. The following is a list of meetings and conferences the A-E shall attend under this task order. The A-E representatives required to attend these conferences are defined below. The exact location, date, and time of each conference will be established by Jacksonville District's Project Engineer.

5.9.2.1. Initial Technical Coordination Meeting. The A-E will host a one day technical coordination meeting during the concept design phase.

5.9.2.2. Preliminary (60%) Design Review Conference. A one-day Preliminary (60%) Design Review Conference will be held at the Jacksonville District Office. A-E representatives shall be: Project Manager and Senior Civil Engineer.

5.9.2.3. Final (100%) Design Review Conference. A one-day Final (100%) Design Review Conference will be held at the Jacksonville District Office. A-E representatives shall be: Project Manager, Senior Civil Engineer (General Site and Drainage Design), Civil Engineer (Highway Design), Senior Geotechnical Engineer, and Senior Electrical Engineer.

The A-E shall take notes and prepare minutes for all meetings and conferences attended during design. Minutes will be prepared in typed form, signed by the A-E Project Manager, and furnished to Jacksonville District's Project Engineer within five calendar days after the meeting/conference for concurrence and distribution to attendees. Copies of all meeting/conference minutes will be included in the Design Documentation Report.

5.9.3. Discussions. The A-E shall provide a written record of all significant discussions and telephone conversations that the firm's representatives participate in, on matters relative to this project. Copies of these records will be included in the Design Documentation Report.

5.10. Topographic Surveys. The Government has performed topographic surveys in the vicinity of this project. These surveys will be provided to the A-E as Government furnished materials (Survey No. 00-216, Aerials No. 00-148, and Aerials No. 00-915). This task order may be modified, at some later date, to have the A-E perform supplemental surveys as required.

5.11. Geotechnical Investigations. The Government has performed geotechnical subsurface investigations and laboratory testing for this project. The results of these investigations shall be provided to the A-E as Government furnished materials.

5.12. Environmental Investigations and Permits. The Government will conduct investigations to delineate wetlands and identify the habitat of endangered species. The A-E shall show these environmentally sensitive areas on the civil site drawings, but is **not** required to obtain any related permits. The Government will prepare applications and perform any agency coordination that is necessary to secure environmental and water quality certification permits.

5.13. Responsibility after Design Completion. The A-E is required to support the Jacksonville District should errors or omissions in the documents create problems in bidding or administering the contract for construction. As needed, the A-E will clarify the design intent and correct any errors or omissions in the original documents. The corrections shall be done in a timely manner at no additional cost to the Government. The A-E shall incorporate amendment changes on the original drawings and/or CADD drawings when requested to do so after the bidding process at no extra cost to the Government. In addition, the A-E shall incorporate amendment changes on the submittal registers and submit one copy in SPECSINTACT format on a disk or CD labeled with the project title, location, and construction contract number. Also, during the bidding period, the A-E is required to assist in answering all bidders inquiries pertaining to the design. If clarifications are required, the A-E will prepare the required amendment. The A-E, however, shall not receive or respond to any direct inquiries from bidders. All inquiries or responses shall be through the Jacksonville District Project Engineer.

5.14. A-E Services During Construction. No A-E services during construction, other than the responsibilities described above, are contemplated at the present time. However, this task order may be modified at some later date to include review of construction contractor submittals, on-site inspections, review of value engineering change proposals, review of contractor substitutions, preparation of design modifications, or other similar services during construction.

## **6. SUBMITTALS AND PERFORMANCE SCHEDULE.**

6.1. Distribution of Submittals. Deliverables for each phase of design shall include a complete set of MicroStation<sup>TM</sup>(\*DGN) files and hard copies of all drawings. Narrative and text documents, specifications, design analysis and cost estimates will be provided in Government approved electronic formats, with hard copies. Electronic files for cost estimates and specifications should be furnished on 3.5" high-density diskettes. All other electronic files should be furnished on recordable compact discs, 650MB/74 minute, DOS compatible, ISO standard. The distribution list and number of copies of each document are shown in Exhibit B.

6.2. Government Review and Comment Resolution. The Government will review all submittals identified under this task order. Formal comments generated during the review will be provided to the A-E via the DrChecks automated review system, and the A-E will respond to the comments via DrChecks. Both parties will discuss these comments, if necessary, and attempt to resolve any unsettled issues that may arise from the review. The time frame for Government review and comment resolution varies however, this process is typically completed within 30 calendar days.

6.3. Performance Periods and Submission Schedules. The performance periods and submission schedules for each phase of design are indicated below. Time for reproduction and mailing is inclusive to the stated durations. The A-E may choose to perform work, at its own risk, during the Government review and comment resolution period, however, comments resulting from that review must be incorporated into the design prior to the next submittal. In the event a subsequent design phase is not authorized, the A-E shall incorporate all available review comments into the design to complete the current phase.

### **6.4. Concept (30%) Design Phase Submittals.**

6.5.1 Quality Control Plan. The A-E shall submit a Quality Control Plan, for review and approval, 15 calendar days after issuance of Notice to Proceed.

6.5.2 Concept (30%) Design Submittal. The A-E shall submit the Concept (30%) Design, for review and approval, 45 calendar days after the issuance of the notice to proceed. This submittal will include drawings, design analysis, a design documentation report, quantity and cost estimates, a bid schedule, an M-CACES construction cost estimate, and other supporting documents.

6.5. Preliminary (60%) Design Phase Submittal. The A-E shall submit the Preliminary (60%) Design, for review and approval, 45 calendar days after receipt of Concept (30%) Design review comments. This submittal will include drawings, outline specifications, design analysis, a design documentation report, quantity and cost estimates, a bid schedule, an M-CACES construction cost estimate, a proposed construction schedule, site plans identifying all right-of- ways (for construction and perpetual operations), a complete order of work clause describing the required sequence of construction operations, and other supporting documents.

6.6. Final (100%) Design Phase Submittals.

6.6.1 Final (100%) Design Submittal. The A-E shall submit the Final (100%) Design, for review and approval, 45 calendar days after receipt of Preliminary (60%) Design review comments. This submittal will include detailed working drawings and specifications necessary for the effective coordination and efficient execution of the construction work. The Final (100%) Design shall also include a construction contractor submittal register, design analysis, a design documentation report, quantity and cost estimates, a bid schedule, an M-CACES construction cost estimate, a proposed construction schedule, site plans identifying all right-of-ways (for construction and perpetual operations), and other supporting documents.

6.6.2 Corrected Final Design Submittal. The A-E shall submit the Corrected Final Design, for review and approval, 28 calendar days after receipt of Final (100%) Design review comments. This submittal will include the same items that are required for the Final (100%) Design submittal.

6.7. Amended Plans And Specifications. The A-E shall provide revised plans and specifications, which include all amendment changes, 14 calendar days after bid opening.

6.8. Request For Payment. The A-E shall include a progress report along with the Payment Estimate – Contract Performance, ENG Form 93 as justification for the amount of payment requested. The progress report shall include in narrative form a Summary of Activities, Estimated Percentage Complete, Project Schedule Evaluation, and Problems and Recommended Solutions.

7. **AUTHORIZED CHANGES.** The A-E shall accept instructions only from the Contracting Officer or his/her duly appointed representative. However, coordination of routine technical matters with Corps of Engineers personnel will be accomplished through the Jacksonville District Project Engineer, Tony Tiger, CESAJ-EN-DL. Direct requests from other agencies should be forwarded to the Project Engineer for consideration.

8. **EXHIBITS.**

- A: Technical Instructions (not included)
- B: Review Distribution List (not included)